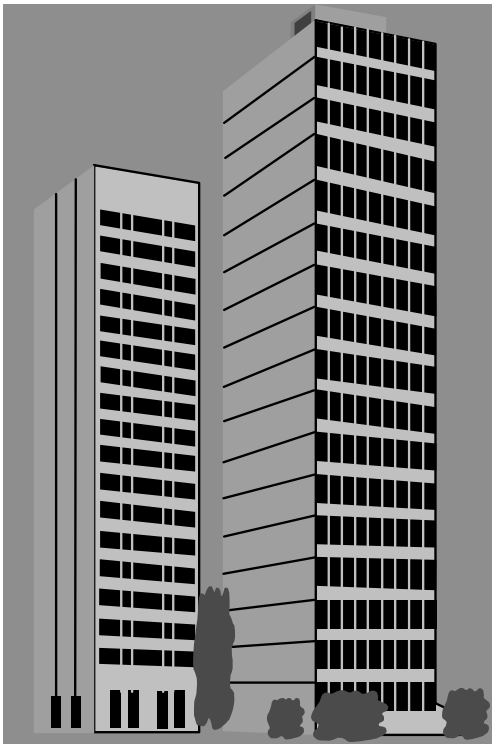
Appendix I

Indoor Air Quality Assessment
MCCT
Cambridge District Court
40 Thorndike Street
Cambridge, Massachusetts

March 1999

INDOOR AIR QUALITY ASSESSMENT

Cambridge District Court
Middlesex County Courthouse
13th, 14th & 15th Floors
Cambridge, MA



Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
March, 1999

Background/Introduction

In response to a request from the Darryl Smith of the Cambridge District Court (CDC) an indoor air quality assessment was done at the at the Middlesex County Courthouse, 40 Thorndike Street, Cambridge, Massachusetts. This assessment was conducted by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA). Long-standing complaints from employees of headache, fatigue and drowsiness are noted in previous reports by MDPH and others were reiterated during this current evaluation.

Visits were made to this building by Michael Feeney, Chief of Emergency Response/Indoor Air Quality (ER/IAQ) on November 25 and December 16, 1998 and January 4, 1999. Mr. Feeney was accompanied by Cory Holmes of the ER/IAQ Program on the January visit.

The CDC is located in a twenty-three story multi-level building. This evaluation included the CDC, which occupies the 13th, 14th and 15th floors, first floor judge's parking garage, the basement, sub-basement and a stairwell that terminates on the 16th floor. The building does not have openable windows. The windows are single paned and have tinting to reduce solar glare (NIOSH, 1990).

This building has been evaluated by a number of agencies over the course of the past ten years because of concerns about asbestos. Numerous asbestos tests have been conducted in the building, the most recent this past summer (Yee Consulting, 1998).

Previous evaluations noted heavy deposition of dirt around air diffusers (MDPH, 1989). The National Institute for Occupational Safety and Health (NIOSH) conducted an evaluation on August 8, 1989 and May 2, 1990. NIOSH concluded that the thermostats in the building needed re-calibration, more fresh air should be introduced through the HVAC system, and that cleaning to reduce environmental dust and limit smoking (NIOSH, 1990) should be enhanced. The Massachusetts Department of Labor and Workforce Development (MDLWD) conducted an evaluation on January 22 & 24, 1997. In addition to the conclusions made in previous reports, MDLWD recommended servicing of the ventilation system, prevention of vehicle exhaust movement

into the building, increasing HVAC filter changes, replacing water damaged materials and disinfecting suspected mold growth (MDLWD, 1997). In addition to these reports are several notices concerning the banning of smoking in public building by Cambridge City Ordinance (Middlesex Superintendent, 1989) and declaration by the Middlesex County Commissioners (Middlesex Superintendent, 1996).

Methods

Air tests for carbon dioxide were taken with the Telaire, Carbon Dioxide Monitor and tests for temperature and relative humidity were taken with the Mannix, ThPen PTH8709 Hygrometer/Thermometer.

Results

The CDC has a population of approximately 100 employees. The tests were taken under normal operating conditions. Test results appear in Tables 1-5.

Discussion

It can be seen from the tables that carbon dioxide levels were below 800 parts per million parts of air [ppm] in all areas sampled. These carbon dioxide levels are indicative of an adequate fresh air supply in this building.

Ventilation

Ventilation is provided by a heating, ventilation and air-conditioning (HVAC) units located in mechanical rooms on each floor of the CDC. Fresh air is supplied by a combination of ceiling mounted air diffusers and induction units located at the base of windows. Airflow from air diffusers in several courtrooms and offices were diverted by ceiling tiles mounted with wires. These jury-rigged ceiling tiles were put into place due to complaints of cold air drafts on room occupants. A number of induction unit air diffusers in offices were blocked by building occupants with books, cardboard and other obstructions. Fresh air intakes are located on the exterior wall of the mechanical rooms on each floor of the CDC.

Exhaust ventilation on these floors is provided by ducted, return air vents that are connected to each air-handling unit. Exhaust vents are also located on the exterior wall of the mechanical rooms on each floor of the CDC.

In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air. The date of the last servicing and balancing of these systems could not be identified at the time of the visit..

The Massachusetts Building Code requires a minimum ventilation rate of 20 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows in each room (SBBRS, 1997). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches.

Temperature readings were within a range of 75^{o} to 81^{o} F. The BEHA recommends that indoor air temperatures be maintained in a range between 70^{o} to 78^{o} F in order to provide for the comfort of building occupants. Influencing temperature control in offices is the window system. Cold air penetrating through window systems was noted in several offices with complaints of cold temperatures. As noted by NIOSH, the

window system is single-paned, which is prone to heating complaints, particularly on the south side of the building. Several thermostats were examined and were found to be inactive. While temperature readings outside the recommended range are generally not a health concern, increased temperature can affect the relative humidity in a building.

The relative humidity in this building was below the BEHA recommended comfort range in the majority of areas sampled. Relative humidity measurements ranged from 21 to 28 percent on November 25, 1998 and 7 to 18 percent on January 4, 1999. The BEHA recommends that indoor air relative humidity is comfortable in a range of 40-60 percent. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Microbial Growth/Moisture Concern

Of note is the location of plants on top of filing cabinets in the southeast corner of the civil clerk's offices. Plant soil and drip pans can be a source of mold growth. Located between the plants and the majority of this room is a portable fan which draws air from the area of the plants and distributes air into the room. Plants should be located away from fans to prevent the aerosolization of pollen, mold and other particulates from these plants.

A number of rooms have water-damaged walls and ceiling tiles which can indicate leaks from the plumbing system. Water-damaged ceiling tiles can provide a medium for mold and mildew growth and should be replaced after a water leak is discovered and repaired.

Other Concerns

A number of conditions were noted within the floors evaluated that indicate a combustion source is penetrating into this building and effecting the 15th floor. Several conditions exist in this building that indicate that vehicle exhaust from the parking garages in combination with hot air from the basement may be rising up stairwells to the 15th floor.

In order to explain how fossil fuel exhaust may be impacting the 15th floor, the following concepts concerning heated air and fossil fuel exhaust must be understood.

1. Heated air will create upward air movement (called the stack effect).
2. Cold air moves to hot air, which creates drafts.
3. As heated air rises, negative pressure is created, which draws cold air to the equipment creating heat (e.g., fluorescent light bulbs).
4. Airflow is created, intended or otherwise, from items that produces heat (e.g., fluorescent light bulbs).
5. Combusted fossil fuels contain heat, gasses and particulates that will rise in air. In addition, the more heated air becomes, the greater airflow increases.
6. Airflow created by the stack effect, drafts or mechanical ventilation can draw particulates into the air stream.

Each of these concepts has influence on the movement of vehicle exhaust to the 15th floor.

Several areas show signs of a black soot deposition. Several previous reports (MDPH, 1989; MDLWD, 1997) indicated that air diffusers were covered with a heavy buildup of particulates. An examination of air diffusers in the 15th floor found that many of these diffusers were cleaned, however evidence of a black soot residue as seen on air diffusers and surrounding ceiling tiles. In addition to residue, some air diffusers nearest the west stairwell in the clerks office show signs of corrosion in a pattern that is consistent with exposure to materials that do not appear to originate from within ductwork.

Of note are the ceilings in three areas, the clerk's vault, the east stairwell and the west stairwell. The clerk's vault had deposition of a black soot above fluorescent light fixtures (see Picture 1). This deposition was heaviest near the ends of fluorescent light bulbs, which are the hottest part of the bulb. Airflow created by the fluorescent lights appears to have captured black soot. The vault does not have fresh air supplies or exhaust vents, which would eliminate the mechanical ventilation system as the source of the black soot. The top of the east and west stairwells terminated at the ceiling of the 16th floor. Each of these stairwell ceilings is heavily coated with a black soot deposition (see Picture 2).

Each stairwell terminates at the 16th floor. The 17th through 23rd floor contains the lockup, which is on a separate HVAC system from the rest of the building. This makes the top of each stairwell an enclosed tube, at the top of which heated air from lower floors can rise and pool (see Figure 1). As demonstrated by the soot deposits on the stairwell ceilings, it appears that fossil fuel exhaust is also mixed with this rising heated air. This is noteworthy because of the previously mentioned soot depositions in the vault, fresh air diffusers and ceiling tiles. This stairwell door is kept ajar to allow for ease of passage between floors. The vault in the clerk's office is roughly opposite to the door to the stairwell of the clerk's office, which has black soot deposition above fluorescent lights. Air diffusers nearest this open door in the halls and main office appear to have the heaviest soot deposition. Noting these conditions, BEHA staff attempted to locate a source of fossil fuel exhaust that appears to be impacting on the 15th floor.

Entrainment of fossil fuel exhaust by fresh air intakes of the HVAC system was eliminated due to the fact that these vents exist on the 14th and 15th floors. The location of these intakes at this height would eliminate street traffic as a potential source. No exterior smokestack or other source of fossil fuel exhaust from other surrounding buildings could be identified. The color and type of soot deposition is not consistent with stains seen in smoking rooms. The building uses steam supplied to the building for heat. No oil furnace or gas burner exists in the building, which eliminates the heating system as a potential source. Indoor parking garages and vehicle ports in the basement of this building appear to be the most likely source of the black soot observed in this building.

Several indoor parking areas exist in this building: the sheriff's department van parking, the sheriff department car parking, the prisoner van entrance and the building loading dock (Figure 2). In addition, the judge's parking lot exists indoors on the first floor above the sheriff's department van parking. With the exception of the judge's parking lot, none of these parking areas have exhaust ventilation. As motor vehicles operate indoors, the production of vehicle exhaust in combination with cold air moving from outdoors through open exterior doors into the warmer garage can place the garage under positive pressure.

Positive pressure within a room will force air and pollutants through spaces around doors, space around utility pipes and other holes in walls and doors into the hallways of the subbasement and basement of the

building. Similar black soot deposition on the 15th floor was observed on subbasement/basement air diffusers and adjacent ceiling tiles. Holes of sprinkler system heads at the base of the east and west stairwells also have soot deposition, which can indicate that the interior walls are being pressurized by heated and vehicle exhaust from indoor garages. Lastly, the loading dock area door from the basement opposite from the elevators appears to be permanently ajar, which allows for vehicle exhaust and trash odors to penetrate the interior of the building.

While the judge's parking lot has a mechanical ventilation system, the temperature of this area is lower than the interior of the building, which would allow for airflow and vehicle exhaust penetration through door and wall holes. As an example, the door leading to the 1st floor lobby from the judge's garage has a large space between its base and the doorframe, through which light from the building can be seen. This space can serve as a means for exhaust gasses to penetrate into the lobby. In close proximity to this door is the first floor door to the west stairwell which can also serve as a means of egress.

Enhancing the movement of vehicle exhaust is the movement of waste heat from the steam mechanical room. The steam mechanical room, whose floor is located in the subbasement, has a door that is permanently wedged open at the basement level opposite the elevator lobby (see Figure 2). The door that serves as the sub-basement entrance to the steam mechanical room is permanently ajar, which creates an air current producing airflow from the steam mechanical room into hallways (see Figure 3). Enhancing this effect is a vent that introduces cold air into the steam mechanical room, which places this area under positive pressure to force heat into hallways. Since the building does not use combustible fuels, it is unclear as to the purpose of this fresh air vent. Because the steam mechanical room produces large amounts of waste heat, it is possible that this vent should be an exhaust vent, which will draw heat out of the steam mechanical room.

Finally, air movement from the basement to the 15th floor is the multiple elevator systems may also be a concern. Most of these elevator shafts terminate at the 15th and 16th floors and therefore provide a similar route to these floors as do the east and west stairwells. In addition to the stack effect, elevators can draw pollutants into the elevator shaft while cars operate. This piston effect can serve to place the basement elevator lobby under negative pressure as cars move upwards, which can then enhance the penetration of vehicle exhaust into occupied areas and hallways through doorframes, and other holes in wall and ceilings.

Employees were observed burning candles in their office. Scents, candle waxes or tallow can produce odors that are irritating to the eyes, nose and throat. In addition, lit candles are also a fire hazard in a office building.

Although smoking is banned in this state office building by local city ordinance (Middlesex Superintendent, 1989) and state law (Middlesex Superintendent, 1996) signs of cigarette smoking were observed in several areas in this building. The central stairwell had cigarette butts on the floor. Conference room 13-37 had cigarette butts left on top of the induction unit.

Environmental tobacco smoke is an indoor air pollutant, a respiratory irritant and can exacerbate the frequency and severity of symptoms in asthmatics. The most effective method of preventing exposure to environmental tobacco smoke is to have smoke free buildings. M.G.L. Chapter 270, Sec. 22 prohibits smoking in public buildings, except in an area which has been specifically designed as a smoking area (M.G.L., 1987). The American Society of Heating, Refrigeration, Air-Conditioning Engineers (ASHRAE) recommends a ventilation rate of 60 cubic feet per minute per occupant in smoking lounges (ASHRAE, 1989). The ASHRAE recommendation is designed to prevent odors of cigarette smoke from penetrating areas outside the designated smoking area. Smoking in this facility should not occur outside of this designate area.

Insecticides were found on a table in the clerk's office. Insecticides contain chemicals that can be irritating to the eyes, nose and throat. One brand in particular, labeled "Fly Jinx", contains an organo-chlorine insecticide. If these insecticides are used on the plants in the clerk's office, operating the portable fans can lead to the aerosolization of these materials.

Exposed fiberglass insulation was observed beneath the refrigerator in the clerk's office kitchen. Fiberglass insulation can be a source of skin, eye and respiratory irritation to certain sensitive individuals.

The clerk magistrate's office restroom contains a shower that appears to have a dry trap. It is possible that that the trap for this drain is either dry or leaking, which can allow for sewer gas to back up into this closet and adjoining offices. Sewer gas can be irritating to the eyes, nose and throat.

Conclusions/Recommendations

The solution to the indoor air quality problem at the CDC is somewhat complicated. The lack of exhaust ventilation for vehicle parking areas combined with the permanent opening of doors of the loading dock, steam mechanical room, the 15th floor west stairwell door and other doors has lead to the possible penetration of vehicle exhaust into the interior of the building. Employee symptoms and complaints reported during this site visit are consistent with what might be expected in an environment with exhaust gasses and particulates from indoor parking areas without mechanical exhaust ventilation system combined with low relative humidity. For this reason a two phase approach is required, consisting of immediate measures to improve air quality within the CDC and long term measures that will require planning and resources to adequately address the overall indoor air quality concerns within this courthouse.

In view of these findings at the time of the visit, the following short-term recommendations are made:

1. Close all doors to the steam machinery room, HVAC system rooms, stairwell doors, interior indoor parking garage doors and the door to the loading dock to minimize airflow from the basement to other areas in the building.
2. Consider installing flashing around all doors that lead from parking garages to the interior of the building.
3. Seal holes for utilities in walls of all indoor parking garages.
4. Reduce or eliminate plants from the clerk's office.
5. Discontinue the use of pesticides in the clerk's office.
6. Seal or remove fiberglass from beneath the clerk's office kitchen refrigerator.
7. Discontinue the use of burning candles in offices.
8. Enforce the no smoking policy in court areas in a manner consistent with state and local law.
9. Consider moving furniture away from fan coil units to better control perceived temperature extremes.

10. Replace water damaged ceiling tiles. This measure will remove actively growing mold colonies that may be present. Ceiling tiles should be removed at a time when employees are not present in the workplace. Contain the area where ceiling tiles are removed to prevent the spread of dust and mold spores in the workplace. This practice should be conducted routinely.
11. Wet the shower drain in the clerk magistrate's restroom to wet the trap to prevent sewer gas odor penetration.
12. Health and building complaints are consistent with what might be encountered in a dry, dusty environment. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, continue scrupulous cleaning practices to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).

The following long-term measures should be considered. A ventilation engineer should be consulted concerning the steam mechanical room and exhaust ventilation for parking garages.

1. Consider the installation of mechanical exhaust ventilation to vent vehicle exhaust outdoors. These systems should create negative pressure to prevent vehicle exhaust penetration into the building interior.
2. Ascertain the purpose of the supply vent in the steam mechanical room.
3. Consider replacing air diffusers in courtrooms with ones that are designed to direct cold air away from jurors. If not possible, consider rearranging the configuration of these courtrooms to move seated individuals out from underneath air diffusers.

References

MDLWD. 1997. Letter to Armando J. DeFillippis, Superintendent, Middlesex County Courthouse from Thomas Trayers of DLWFD, dated January 30, 1997. Department of Labor and Workforce Development, Division of Occupational Safety, West Newton, MA.

MDPH. 1989. Inspection Report for Middlesex District Courthouse. Massachusetts Department of Public Health, Division of Community Sanitation, Boston, MA.

M.G.L. 1987. Smoking in Public Place. Massachusetts General Laws. M.G.L. c. 270, sec. 22.

Middlesex Jail. 1998. Memo to Rosa Chavez, Facility Manager of the Middlesex County Courthouse from Superintendent T. McCarthy concerning Public Health Inspection Report, dates November 10, 1998. Middlesex Jail-Cambridge, Superintendent's Office, Cambridge, MA.

Middlesex Superintendent. 1989. Memorandum from James F. Morris, Superintendent of Buildings to All Dept. Heads at Cambridge Superior Courthouse et al. concerning No Smoking Ordinance and Air Quality. County of Middlesex, Office of the Superintendent of Buildings, Cambridge, MA.

Middlesex Superintendent. 1996. Letter from Joseph Bradley, Director of Custodial Services concerning the Middlesex Superior Courthouse a Non-Smoking Facility. County of Middlesex, Office of the Superintendent of Buildings, Cambridge, MA.

NIOSH. 1990. Letter to John Buonomo, County Administrator from Edward Kaiser, Regional Industrial Hygienist, NIOSH, Concerning Indoor Air Quality and Asbestos, dated October 24, 1990. National Institute for Occupational Health and Safety, Region 1, Boston, MA. HETA 89-238.

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R. 1910.1000 Table Z-1-A.

SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

Yee Consulting. 1998. Letter to Vladimir Lyubetsky of Drummey, Rosane & Anderson, Inc. from Jason D. LaVena of Yee Consulting concerning Air Sampling Results, Middlesex County Courthouse, Cambridge, MA dated June 4, 1998. Yee Consulting Group, Boston, MA.

Figure 1 Air Movement Up Stairwells and Elevator Shafts of the Cambridge District Court Building

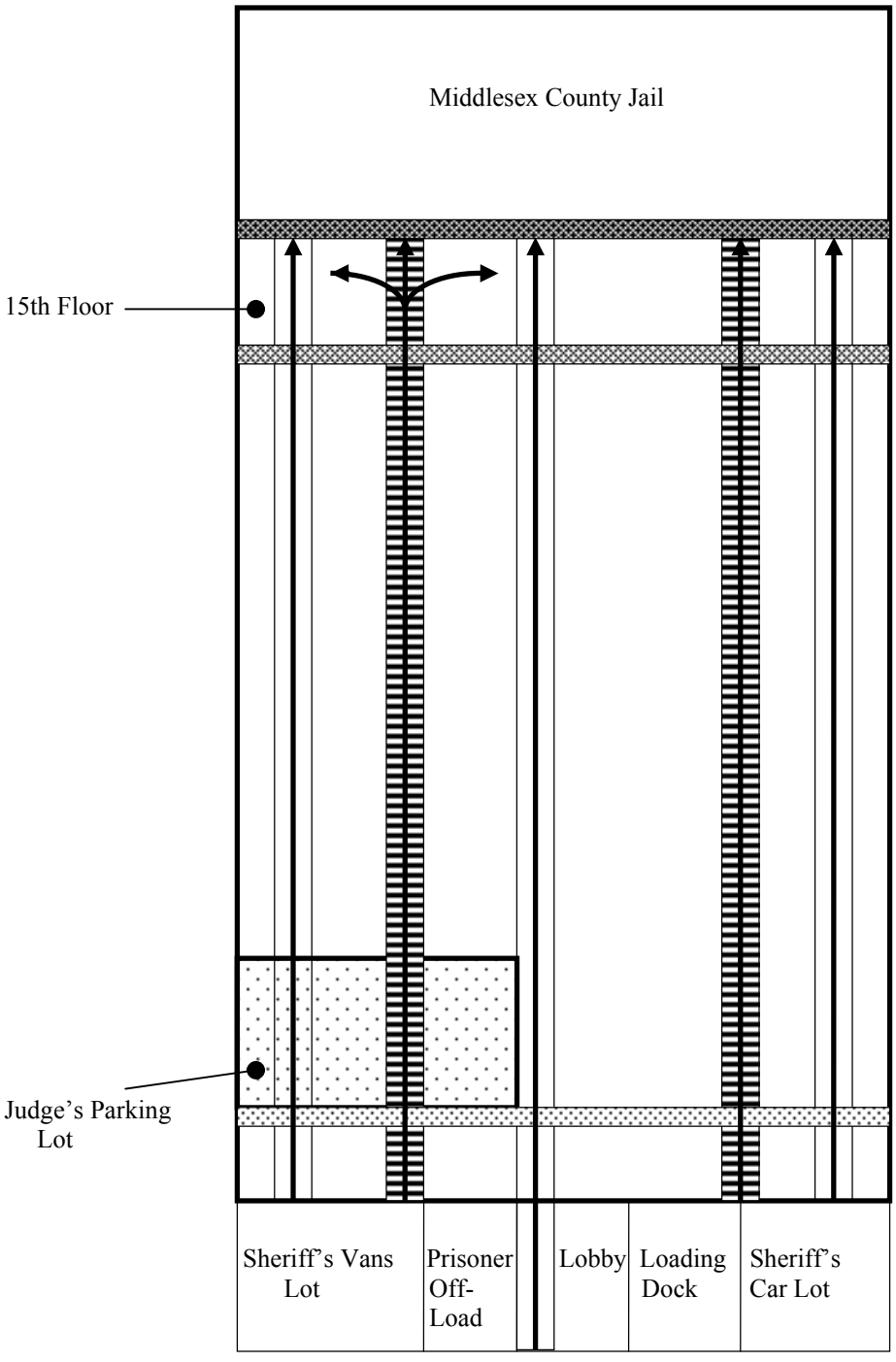


Figure 3 Air Movement Created by the Steam Mechanical Room

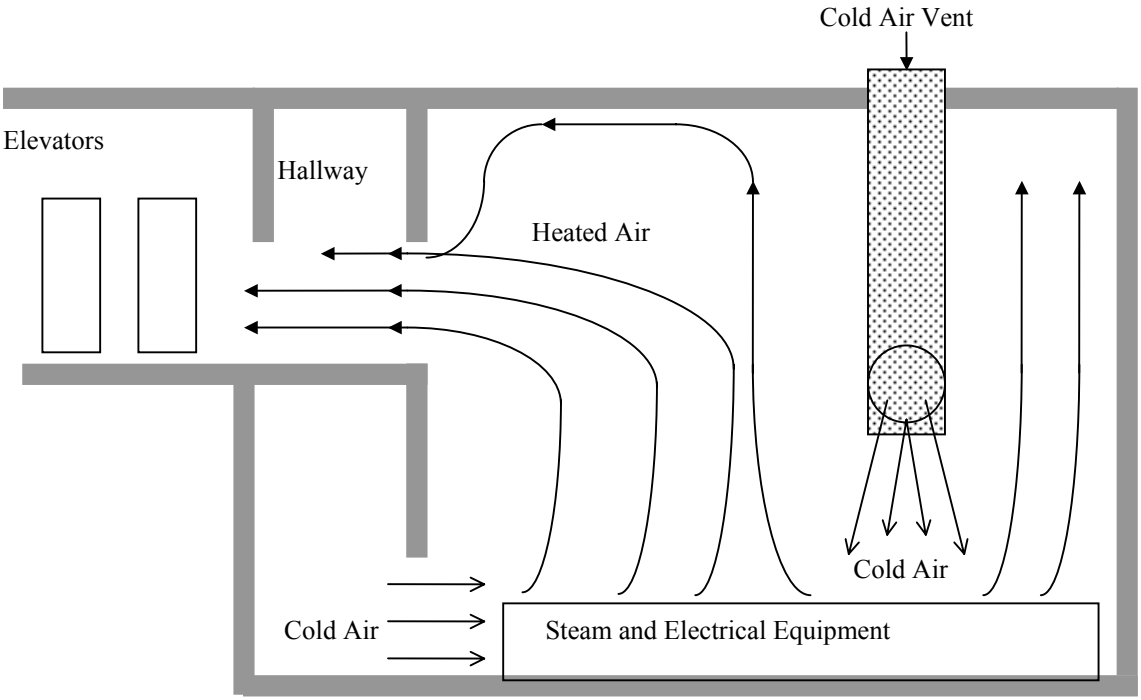
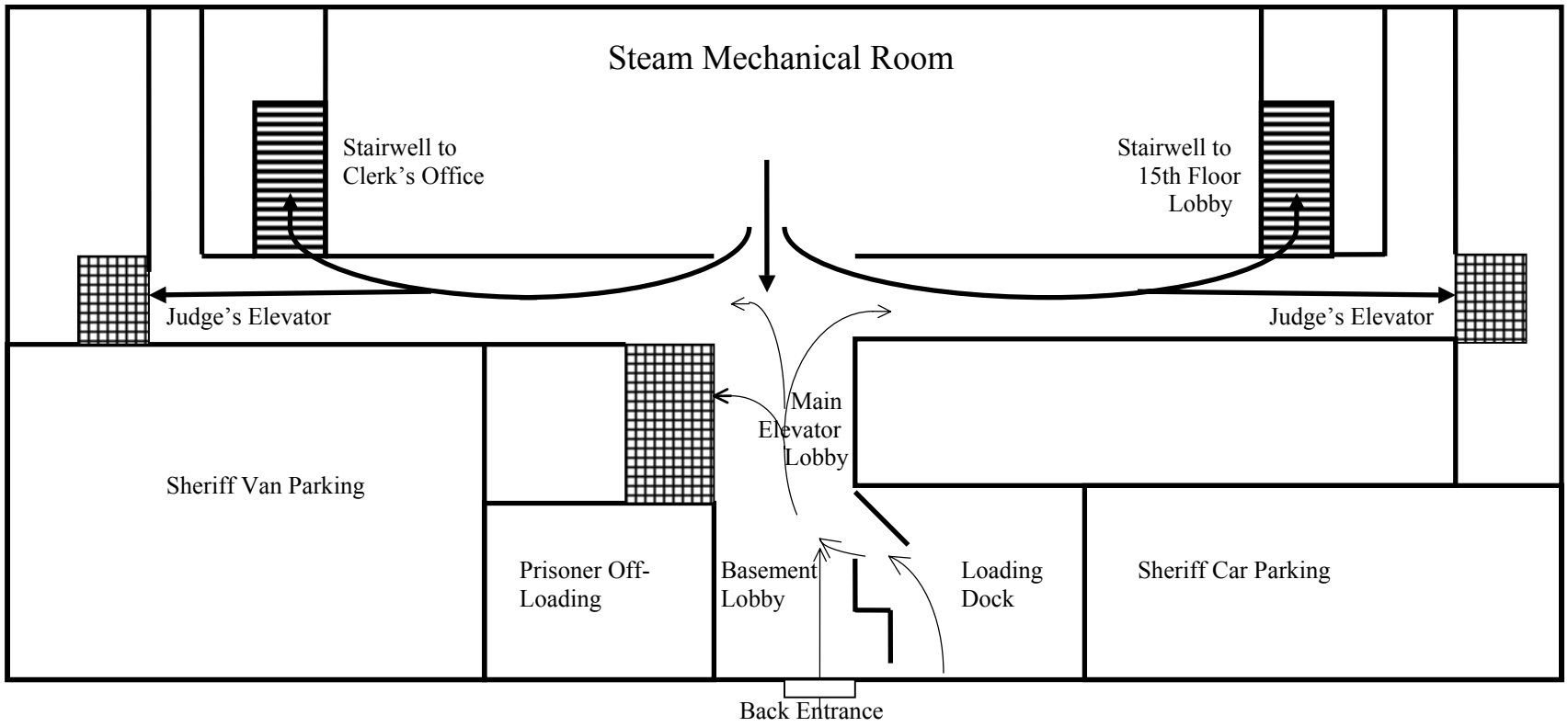


Figure not to scale

Figure 2 **Air Movement in the Basement Floor of the Cambridge District Court Building**



Key

- Elevators
- Stairwells to the 15th Floor
- Heated Air
- Cold Air

Figure not to scale

TABLES

Indoor Air Test Results - Cambridge District Court, Cambridge November 25, 1998

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Outside (Background)	479	61	33					
1st Session 13B	648	76	26	46	no	yes	yes	
2nd Session 13A	675	75	25	13	no	yes	yes	
Court Room #3	643	75	27	15	no	yes	yes	
Kitchen 15-34	732	75	28	1	no	yes	no	refridgerator -fiberglass under return vent
15-27	560	73	27	0	no	yes	yes	CT(2), water leaks around windows, draft through windows, door open
15-26	523	72	27	0	no	yes	yes	door open
15-25	522	74	28	0	no	yes	yes	room heater, door open
Clerk Magistrate Record Storage	502	74	24	1	no	yes	yes	water-damage-light, stains on walls-light-soda stained ceiling
Clerk Magistrate Main Office	552	75	23	12	no	yes	yes	window difusers blocked, door open
15-31	534	77	24	0	no	yes	yes	
15-31	669	76	12	1	no	yes	no	door open
15-27	617	74	11	0	no	yes	yes	door open
Vault - Clerk's Office	591	73	16	1	no	no	no	door open
15-18	597	74	14	0	no	yes	yes	supply off, door open

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Probate Break-Room	820	76	14	2	no	yes	yes	door open
Computer Room 1544	781	76	13	0	no	yes	yes	supply blocked by books, door open
Probate Cashier	661	77	11	1	no	yes	yes	door open
1556	606	73	13	0	no	yes	yes	door open
1558	765	72	14	1	no	yes	yes	exhaust off, door open
Assistant Com. Probate Office	785	73	16	1	no	yes	yes	door open
Jury Room #1 1450	583	74	13	0	no	yes	yes	
Jury Room #2	593	74	13	0	no	yes	yes	door open
14-4 Break Room	613	81	11	0	no	yes	yes	
Probate Main Office	592	75	21	7	no	yes	yes	
15-44	770	75	26	6	no	yes	yes	door open, 3 computers
Probation Kitchen	603	75	23	0	no	yes	yes	refridgerator
Probation Vault	629	73	27	0	no	no	no	

*** ppm = parts per million parts of air**
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

Indoor Air Test Results - Cambridge District Court, Cambridge January 4, 1999

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Outside (Background)	378	39	30					
1st Session	981	75	18	39	no			
Hallway (Outside 1st Session)	860	79	18	2	no	yes	yes	
2nd Session	702	79	15	7	no	yes	yes	supply weak
Judge Sprague	571	75	12	1	no	yes	yes	air purifier, personal fan, door open
Law Library	543	75	12	0	no	yes	yes	
Judge's Main Lobby	582	75	15	4	no	yes	yes	4 computers, 2 laser-copiers, water-cooler
Judge Brant	543	76	16	0	no	yes	yes	temperature complaints (too cold), space heater
Judge Singleton	530	75	13	0	no	yes	yes	
Lobby 1301	555	75	16	0	no			
Restroom				0	no		yes	exhaust weak
Hallway - 14th Flr. "Jury of Six"	712	77	15	17	no	yes	yes	no ceiling exhaust vents, mechanical room door vents
D.A.'s Office Hallway	668	79	14	5	no	yes	yes	water cooler-bottle storage on floor
14-11 Court Room #5	900	79	16	18	no	yes	yes	
14-12 Court Room #4	686	79	13	0	no	yes	yes	tiles suspended over air diffusers

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
14-15 Court Room #3	730	80	14	5	no	yes	yes	1 tile over diffuser
Court Room 15-6	636	81	9	0	no	yes	yes	heat complaints
Court Room 15-7	619	81	9	0	no	yes	yes	heat complaints
Clerk's Office "Small Claims"	541	74	11	3	no	yes	yes	cold complaints from window vents
Clerk's Office "Criminal"	535	74	10	5	no	yes	yes	pyrethrin insecticides, methoxychlor, DDVP
Clerk's Office "Traffic Violations"	528	76	10	4	no	yes	yes	
Main Office Area Adult Probation	492	76	8	2	no	yes	yes	personal fans, ventilation weak
1st Assistant Chief Probation Officer	528	76	10	0	no	yes	yes	door open, temperature complaints
Probation Officer	495	75	10	0	no	yes	yes	door open, ventilation weak, CT(1) - possible mold growth
15-64	493	76	82	0	no	yes	yes	door open
15-61 Chief Probation Officer	480	75	13	0	no	yes	yes	door open
Probation Office Hallway								CT(4) - potential mold growth
14-5 Probation	507	76	11	1	no	yes	yes	
"Jury of Six" Area	525	81	7	2	no	yes	yes	vent diffuser covered with suspended tile, candle burning
14-34	515	77	8	1	no	yes	yes	black substance on ceiling tile-possible mold growth
Conference Room 13-37	530	75	9	0	no	yes	yes	cigarette butts, 1 exhaust vent closed

*** ppm = parts per million parts of air**

Comfort Guidelines **CT = water-damaged ceiling tiles**

Carbon Dioxide -	< 600 ppm = preferred
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Temperature -	70 - 78 °F
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